

What is claimed is:

1 1. A circuit arrangement, comprising:
2 a line buffer having a width; and
3 an image scaling circuit coupled to the line buffer and configured to
4 generate a scaled image from a source image by partitioning the source image into
5 a plurality of partitions and image scaling each partition using the line buffer,
6 wherein each partition has a width that is no greater than that of the line buffer,
7 and the scaled image has an overall width that is greater than that of the line
8 buffer.

1 2. The circuit arrangement of claim 1, wherein the plurality of partitions includes
2 first and second partitions arranged adjacent to one another in the source image, and
3 wherein the image scaling circuit is further configured to store boundary conditions for
4 the first partition for use during image scaling of the second partition.

1 3. The circuit arrangement of claim 2, wherein the image scaling circuit is
2 configured to initiate a partition boundary save operation to store the boundary conditions
3 for the first partition upon image scaling a last line of the first partition, and to initiate a
4 partition boundary restore operation prior to image scaling a first line of the second
5 partition to retrieve the stored boundary conditions for use during image scaling of the
6 second partition.

1 4. The circuit arrangement of claim 3, wherein the image scaling circuit is
2 configured to initiate a partition boundary restore operation to retrieve the stored
3 boundary conditions prior to image scaling each line of the second partition.

1 5. The circuit arrangement of claim 2, wherein the boundary conditions initialize
2 the image scaling circuit during image scaling of the second partition to a state that would
3 occur were image scaling performed jointly on the first and second partitions.

1 6. The circuit arrangement of claim 2, wherein the boundary conditions include at
2 least one of a partition read start address, a partition write start address, a horizontal filter
3 pixel count, a horizontal filter pixel phase, a horizontal filter output count, a horizontal
4 filter reduction count, and a horizontal pixel decrement value.

1 7. The circuit arrangement of claim 1, wherein the image scaling circuit
2 comprises:

3 a memory read unit configured to retrieve source image data from a
4 memory;

5 a horizontal filter unit coupled to the memory read unit and configured to
6 horizontally scale the source image data retrieved from the memory to generate
7 horizontally-scaled image data;

8 a vertical filter unit coupled to the horizontal filter unit and configured to
9 vertically scale the horizontally-scaled image data to generate scaled image data,
10 wherein the line buffer is disposed in the vertical filter unit; and

11 a memory write unit coupled to the vertical filter and configured to store
12 the scaled image data in the memory.

1 8. The circuit arrangement of claim 7, further comprising a save/restore circuit
2 configured to initiate a partition boundary save operation upon processing of a last line of
3 a first partition, and to initiate a partition boundary restore operation prior to processing a
4 first line of a second partition to retrieve the stored boundary conditions for use during
5 image scaling of the second partition.

1 9. The circuit arrangement of claim 7, wherein each of the memory read and write
2 units includes a pixel format converter.

1 10. The circuit arrangement of claim 7, wherein each of the vertical and
2 horizontal filter units includes a symmetric non-linear filter.

1 11. The circuit arrangement of claim 1, wherein the line buffer has a width less
2 than or equal to about 512 pixels.

1 12. The circuit arrangement of claim 1, wherein each partition includes a plurality
2 of lines, wherein the image scaling circuit is configured to image scale each partition by
3 longitudinally scaling each of the plurality of lines, and wherein the width of each line of
4 each partition is no greater than that of the line buffer after longitudinal scaling.

1 13. The circuit arrangement of claim 1, wherein each partition includes a plurality
2 of lines, wherein the image scaling circuit is configured to image scale each partition by
3 longitudinally scaling each of the plurality of lines, and wherein the width of each line of
4 each partition is no greater than that of the line buffer after prior to longitudinal scaling.

1 14. An integrated circuit device comprising the circuit arrangement of claim 1.

1 15. An apparatus comprising the circuit arrangement of claim 1.

1 16. A program product, comprising a hardware definition program that defines
2 the circuit arrangement of claim 1; and a signal bearing media bearing the hardware
3 definition program, wherein the signal bearing media includes at least one of a
4 transmission type media and a recordable media.

1 17. A method of scaling a graphical image, the method comprising:
2 partitioning a source image into a plurality of partitions; and
3 image scaling each partition using the line buffer to generate a scaled
4 image, wherein each partition has a width that is no greater than that of the line
5 buffer, and the scaled image has an overall width that is greater than that of the
6 line buffer.

1 18. The method of claim 17, wherein the plurality of partitions includes first and
2 second partitions arranged adjacent to one another in the source image, and wherein
3 image scaling the first partition includes storing boundary conditions for the first partition
4 for use during image scaling of the second partition.

1 19. The method of claim 18, wherein storing boundary conditions for the first
2 partition includes initiating a partition boundary save operation to store the boundary
3 conditions for the first partition upon image scaling a last line of the first partition, and
4 wherein image scaling the second partition includes initiating a partition boundary restore
5 operation prior to image scaling a first line of the second partition to retrieve the stored
6 boundary conditions for use during image scaling of the second partition.

1 20. The method of claim 19, wherein initiating the partition boundary restore
2 operation is performed prior to image scaling each line of the second partition.

1 21. The method of claim 18, wherein the boundary conditions initialize an image
2 scaling circuit that performs the image scaling during image scaling of the second
3 partition to a state that would occur were image scaling performed jointly on the first and
4 second partitions.

1 22. The method of claim 18, wherein the boundary conditions include at least one
2 of a partition read start address, a partition write start address, a horizontal filter pixel
3 count, a horizontal filter pixel phase, a horizontal filter output count, a horizontal filter
4 reduction count, and a horizontal pixel decrement value used by an image scaling circuit.

1 23. The method of claim 17, wherein image scaling is performed by an image
2 scaling circuit that includes:

3 a memory read unit configured to retrieve source image data from a
4 memory;

5 a horizontal filter unit coupled to the memory read unit and configured to
6 horizontally scale the source image data retrieved from the memory to generate
7 horizontally-scaled image data;

8 a vertical filter unit coupled to the horizontal filter unit and configured to
9 vertically scale the horizontally-scaled image data to generate scaled image data,
10 wherein the line buffer is disposed in the vertical filter unit; and

11 a memory write unit coupled to the vertical filter and configured to store
12 the scaled image data in the memory.

1 24. The method of claim 23, wherein the image scaling circuit further includes a
2 save/restore circuit configured to initiate a partition boundary save operation upon
3 processing of a last line of a first partition, and to initiate a partition boundary restore
4 operation prior to processing a first line of a second partition to retrieve the stored
5 boundary conditions for use during image scaling of the second partition.

1 25. The method of claim 17, wherein each partition includes a plurality of lines,
2 wherein image scaling each partition includes longitudinally scaling each of the plurality
3 of lines, and wherein the width of each line of each partition is no greater than that of the
4 line buffer after longitudinal scaling.

1 26. The method of claim 17, wherein each partition includes a plurality of lines,
2 wherein image scaling each partition includes longitudinally scaling each of the plurality
3 of lines, and wherein the width of each line of each partition is no greater than that of the
4 line buffer prior to longitudinal scaling.

1 27. A method of scaling a graphical image, the method comprising:
2 transferring image data for a source image from a memory to a horizontal
3 filter such that the horizontal filter receives the image data arranged into a
4 plurality of horizontally-arranged partitions, with each partition including a
5 plurality of lines of image data;

6 horizontally scaling each line of image data in each partition using the
7 horizontal filter to generate a plurality of horizontally-scaled lines of image data;
8 and

9 vertically scaling the plurality of horizontally-scaled lines of image data
10 using a vertical filter to generate a scaled image, wherein the vertical filter
11 includes at least one line buffer configured to store the horizontally-scaled lines of
12 image data, and wherein each horizontally-scaled line of image data has a width
13 that is no greater than that of the line buffer, and the overall width of the scaled
14 image is greater than that of the line buffer.